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(54) RESIN COMPOSITION FOR ADHESIVE SHEET SUBSTRATE, SUBSTRATE FOR ADHESIVE SHEET AND ADHESIVE SHEET USING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a resin composition used for adhesive sheet substrates, suitable for energy-saving measures and VOC measures in the recent years, capable of arbitrarily setting the mechanical characteristics of films, having a high gel fraction and low water absorption and giving excellent characteristics to the adhesive sheets.

SOLUTION: This resin composition for adhesive sheet substrates comprises (A) a urethane acrylate and (B) a reactive diluent. The urethane acrylate A is the reaction product of a polyester polyol and a polyisocyanate compound with a monohydroxyalkyl (meth)acrylate. The weight-average mol.wt. of the urethane acrylate A is preferably 1,000-10,000.

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CLAIMS

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[Claim(s)]

[Claim 1] The resin constituent for pressure sensitive adhesive sheet base materials containing urethane acrylate (A) and a reactant diluent (B).

[Claim 2] The resin constituent for pressure sensitive adhesive sheet base materials according to claim 1 whose urethane acrylate (A) is polyester polyol, the poly isocyanate compound, and the reactant of mono-hydroxyalkyl (meta) acrylate.

[Claim 3] The resin constituent for pressure sensitive adhesive sheet base materials according to claim 1 or 2 whose weight average molecular weight of urethane acrylate (A) is 1,000-10,000.

[Claim 4] Claim 1 whose reactant diluent (B) is the monomer which has one partial saturation duplex association in 1 molecule thru/or the resin constituent for pressure sensitive adhesive sheet base materials of 3 given in any 1 term.

[Claim 5] Claim 1 containing a photopolymerization initiator (C) thru/or the resin constituent for pressure sensitive adhesive sheet base materials of 4 given in any 1 term.

[Claim 6] The base material for pressure sensitive adhesive sheets which consists of a hardening film of claim 1 thru/or the resin constituent of five given in any 1 term.

[Claim 7] The pressure sensitive adhesive sheet which has an adhesive layer to one side or both sides of a pressure sensitive adhesive sheet base material according to claim 6.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the resin constituent for pressure sensitive adhesive sheet base materials hardened with an activity energy line, its hardening film, and the pressure sensitive adhesive sheet using it.

[0002]

[Description of the Prior Art] Conventionally, engineering plastics, such as thermoplastics, such as polyethylene, polypropylene, and a polyvinyl chloride, and polyethylene terephthalate, etc. are used as a pressure sensitive adhesive sheet base material, and it is manufactured by the approach of desiccation of a solvent by the spreading following \*\* of the cast of resin melting liquid, or a resin solution. However, for energy saving and the cure against VOC (volatile organic compound) in recent years, it is incongruent, and the improvement is called for.

[0003]

[Problem(s) to be Solved by the Invention] After this invention solves the above-mentioned trouble, applies the resin constituent for pressure sensitive adhesive sheet base materials hardened with an activity energy line and obtains a hardening film by the exposure of an activity energy line, it forms an adhesive layer in the one side or both sides, and creates a pressure sensitive adhesive sheet.

[0004]

[Means for Solving the Problem] The resin constituent for pressure sensitive adhesive sheet base materials with which this invention contains (1) urethane acrylate (A) and a reactant diluent (B), (2) The resin constituent for pressure sensitive adhesive sheet base materials of the above-mentioned (1) publication whose urethane acrylate (A) is polyester polyol, the poly isocyanate compound, and the reactant of mono-hydroxy (meta) acrylate, (3) The above (1) whose weight average molecular weight of urethane acrylate (A) is 1, and 000-100,000, or the resin constituent for pressure sensitive adhesive sheet base materials given in (2), (4) The above (1) whose reactant diluent (B) is the monomer which has one partial saturation duplex association in 1 molecule thru/or the resin constituent for pressure sensitive adhesive sheet base materials of (3) given in any 1 term, (5) The above (1) which uses a photopolymerization initiator (C) as an indispensable component thru/or the resin constituent for pressure sensitive adhesive sheet base materials of (4) given in any 1 term, (6) It is related with the pressure sensitive adhesive sheet which has an adhesive layer to one side or both sides of the base material for pressure sensitive adhesive sheets, and a pressure sensitive adhesive sheet base material given in (7) above-mentioned (6) which consist of a hardening film of the resin constituent of (5) the above (1) thru/or given in any 1 term.

[0005]

[Embodiment of the Invention] The resin constituent for pressure sensitive adhesive sheet base materials of this invention contains urethane acrylate (A) and a reactant diluent (B).

[0006] The urethane acrylate (A) used by this invention is obtained by the acrylate-ized reaction for which mono-hydroxyalkyl (meta) acrylate (c) is made to react to the end isocyanate urethane

prepolymer which a polyol compound (a) and the poly isocyanate compound (b) are made to urethane-ization-react, and is obtained. the molecular weight of this urethane acrylate (A) has 1, 000-100, and the desirable thing that it is 000 (GPC (gel permeation chromatography) -- based on law) as weight average molecular weight.

[0007] As a polyol compound (a) used for urethane acrylate (A) composition, although polyester polyol, polyether polyol, acrylic polyol, polybutadiene polyol, FENO rucksack polyol, epoxy polyol, fire-resistant polyol, etc. are mentioned, for example, polyester polyol is desirable, considering the viewpoint of a hauling property. As for the molecular weight of these polyol compounds, what is been 100-100,000 (based on the GPC method) is desirable as weight average molecular weight. Moreover, these polyol compounds can mix and use independent or two sorts or more.

[0008] As polyester polyol, condensation mold polyester polyol, addition polymerization polyester polyol, polycarbonate polyol, etc. are mentioned, for example. As condensation mold polyester polyol, what is obtained, for example by the condensation reaction of diol compounds, such as ethylene glycol, propylene glycol, a diethylene glycol, 1,4-butanediol, neopentyl glycol, 1,6-hexanediol, 3-methyl 1,5-pentanediol, 1, 9-nonane diol, 1, 4-hexane dimethanol, dimer acid diol, and a polyethylene glycol, and organic polybasic acid, such as an adipic acid, isophthalic acid, a terephthalic acid, and a sebacic acid, is raised. As addition polymerization polyester polyol, the poly caprolactone polyol is mentioned, for example. What is compounded as polycarbonate polyol, for example by the ester interchange method by the formation of a direct phosgene of polyol and diphenyl carbonate etc. is mentioned. As for the molecular weight of these polyester polyol compound, what is been 100-100,000 (based on the GPC method) is desirable as weight average molecular weight.

[0009] As polyether polyol, PEG (polyethylene glycol) system polyol, PPG (polypropylene glycol) system polyol, PTG system polyol, the ethylene KISAIDO addition product of bisphenol A, or the propylene oxide addition product of bisphenol A is mentioned, for example. PEG system polyol made the reaction initiator the compound which has active hydrogen, the addition polymerization of the ethyleneoxide is carried out, PPG system polyol made the reaction initiator the compound which has active hydrogen, the addition polymerization of the propylene oxide is carried out, and PTG system polyol is compounded by the cationic polymerization of a tetrahydrofuran. As for the molecular weight of these polyethers polyol compound, what is been 100-100,000 (based on the GPC method) is desirable as weight average molecular weight.

[0010] As acrylic polyol, the copolymerization object of hydroxyl content (meta) acrylic ester and the other (meta) acrylic ester is raised, for example, and what is been 1000-100,000 (based on the GPC method) is desirable as weight average molecular weight. As polybutadiene polyol, the gay or copolymer which has hydroxyl is raised with the copolymerization object of a butadiene, for example to an end, the polyol which contains a phenol molecule, for example in intramolecular is raised as FENO rucksack polyol, and the polyol which contains the Lynn atom, a halogen atom, etc., for example in intramolecular is raised as fire-resistant polyol. As for the molecular weight of these polyol compounds, what is been 100-100,000 (based on the GPC method) is desirable as weight average molecular weight.

[0011] As a poly isocyanate compound (b) used for urethane acrylate (A) composition For example, 2 and 4- and/or 2, 6-tolylene diisocyanate, 4, and 4'-diphenylmethane diisocyanate (MDI), A polymeric MDI, 1, 5-naphthylene diisocyanate, tolidine di-isocyanate, 1,6-hexamethylene diisocyanate, trimethyl hexamethylene di-isocyanate, Isophorone diisocyanate, xylylene diisocyanate (XDI), Hydrogenation XDI, Hydrogenation MDI, lysine diisocyanate, triphenylmethane triisocyanate, tris (isocyanate phenyl) thio phosphate, etc. are mentioned. Independent or two sorts or more can be mixed and used for these poly isocyanate compound.

[0012] As mono-hydroxyalkyl (meta) acrylate (c) used for urethane acrylate (A) composition, 2-hydroxyethyl (meta) acrylate, 2-hydroxy propyl (meta) acrylate, GURISHIDORUJI (meta) acrylate, caprolactone denaturation 2-hydroxyethyl (meta) acrylate, pen TAERISURITORUTORI (meta) acrylate, etc. are mentioned, and less than 1000 thing has desirable molecular weight. These mono-hydroxyalkyl (meta) acrylate (c) Independent or two sorts or more can be mixed and used.

[0013] An end isocyanate urethane prepolymer is obtained by making said poly isocyanate compound

(b) react to said polyol compound (a). It is desirable to make 1.1-2.0Eq of isocyanate radicals of the poly isocyanate compound react to 1Eq of hydroxyl groups of this polyol compound at this urethane-ized reaction. moreover, the reaction temperature of this urethane-ized reaction -- usually -- ordinary temperature - 100 degrees C is 50-90 degrees C preferably. Although the reaction of these hydroxyl groups and an isocyanate radical advances with a non-catalyst, catalysts, such as a RIECHIRU amine, dibutyltin dilaurate, and dibutyltin diacetate, may be added, for example.

[0014] Thus, urethane acrylate (A) is obtained by making said mono-hydroxyalkyl (meta) acrylate (c) react to the obtained end isocyanate urethane prepolymer. At this acrylate-ized reaction, it is 1.0-1.1Eq to make 0.9-1.5Eq of the hydroxyl group of mono-hydroxyalkyl (meta) acrylate react to 1Eq of isocyanate radicals of this end isocyanate urethane prepolymer desirable especially preferably. reaction temperature -- usually -- ordinary temperature - 100 degrees C is 50-90 degrees C preferably. In order to prevent gelation by the radical polymerization during this reaction, it is usually desirable to add polymerization inhibitor, such as 50-2000 ppm hydroquinone, the hydroquinone monomethyl ether, p-methoxy phenol, and para benzoquinone. Although the reaction of these hydroxyl groups and an isocyanate radical advances with a non-catalyst, catalysts, such as triethylamine, dibutyltin dilaurate, and dibutyltin diacetate, may be added, for example.

[0015] In addition, the following diluent (B) may be made to live together in an above-mentioned urethane-ized reaction and/or acrylate-ized reaction time. The amount of the diluent used of reaction time has [ that what is necessary is just to become the viscosity which can agitate reaction mixture ] desirable 1 - 50 weight section to the urethane acrylate 100 weight section. Independent or two sorts or more can be mixed and used for these diluents.

[0016] The thing liquefied in ordinary temperature (25 degrees C) of the reactant diluent (B) used by this invention is desirable, for example, vinyl compounds, such as two or polyfunctional acrylate which it has three or more and N-vinyl pyrrolidone, N-vinyl KAPURU lactone, and styrene, etc. are raised in an acrylate radical into molecules other than epoxy (meta) acrylate, the monofunctional acrylate which has one acrylate radical in molecules other than epoxy (meta) acrylate, and epoxy (meta) acrylate. Independent or two sorts or more can be mixed and used for these reactivity diluent (B).

[0017] As epoxy (meta) acrylate, monochrome or a poly glycidyl compound, the reactant of an acrylic acid (meta), etc. are raised, for example. As monochrome or a poly glycidyl compound, butyl glycidyl ether, phenyl glycidyl ether, polyethylene glycol diglycidyl ether, polypropylene glycol diglycidyl ether, 1, 6-hexanediol diglycidyl ether, diglycidyl hexahydrophthalate, glycerol poly glycidyl ether, glycerol poly ethoxy glycidyl ether, trimethylolpropane polyglycidyl ether, trimethylol propane PORIETOKISHI poly glycidyl ether, etc. are raised, for example.

[0018] As monofunctional acrylate which has one acrylate radical other than epoxy (meta) acrylate For example, phenoxy ethyl (meta) acrylate, benzyl (meta) acrylate, Cyclohexyl (meta) acrylate, phenyloxy ethyloxy ethyl (meta) acrylate, Isobornyl (meta) acrylate, 2-ethylhexyl (meta) acrylate, Stearyl (meta) acrylate, tetrahydrofurfuryl (meta) acrylate, Caprolactone denaturation tetrahydrofurfuryl (meta) acrylate, Lauryl (meta) acrylate, isodecyl (meta) acrylate, Tridecyl (meta) acrylate, JISHIKURO pentenyl (meta) acrylate, JISHIKURO pentenyl oxy-ethyl (meta) acrylate, carbitol (meta) acrylate, Acryloyl morpholine, nonyl phenoxy polyethylene-glycol (meta) acrylate, Nonyl phenoxy polypropylene-glycol (meta) acrylate, hydroxyl-group content (meta) acrylate (for example, 2-hydroxyethyl (meta) acrylate --) The acid anhydride of 2-hydroxypropyl (meta) acrylate, 1,4-butanediol monochrome (meta) acrylate, etc. and a multiple-valued carboxylic-acid compound The half ester which is (for example, reactants, such as a non-succinic acid, a maleic anhydride, phthalic anhydride, tetrahydro phthalic anhydride, and hexahydro phthalic anhydride) is raised.

[0019] An acrylate radical in molecules other than epoxy (meta) acrylate as two or polyfunctional acrylate which it has three or more For example, ethyleneoxide denaturation bisphenol A di(meth) acrylate, Propylene oxide denaturation bisphenol A di(meth)acrylate, Ethyleneoxide denaturation bisphenol F di(meth)acrylate, 1, 4-butane JIORUJI (meta) acrylate, JISHIKURO PENTENIRUJI (meta) acrylate, HIDORIKISHI pivalate neopentyl GURIKORUJI (meta) acrylate, KAPURU lactone denaturation HIDORIKISHI pivalate neopentyl GURIKORUJI (meta) acrylate, Polyethylene

GURIKORUJI (meta) acrylate, tripropylene GURIKORUJI (meta) acrylate, Neopentyl GURIKORUJI (meta) acrylate, TORIMECHI roll pro pantry (meta) acrylate, Trimethylol propane PORIETOKISHITORI (meta) acrylate, glycerol polypropylene POKISHITORI (meta) acrylate, Pentaerythritol tetrapod (meta) acrylate, the Pori (meta) acrylate of the reactant of dipentaerythritol and epsilon-caprolactone, dipentaerythritol poly (meta) acrylate, etc. are raised.

[0020] A photopolymerization initiator (C) is used when using ultraviolet rays mainly as an activity energy line. As a photopolymerization initiator (C), for example A benzophenone, 1-hydroxy-cyclohexyl-phenyl ketone, 2, 4-diethyl thioxan ton, 2-chloro thioxan ton, an isopropyl thioxan ton, 2-methyl-1-[4-(methylthio) phenyl]-2-morpholinopropane -1, 2-benzyl-2-dimethylamino-1-(4-morpholino phenyl)-1-butanone, A 4-benzoyl-4'-methyl diphenyl sulfide, 2 and 4, 6-trimethyl benzoyl diphenylphosphine oxide, a MIHIRAZU ketone, benzyl dimethyl ketal, 2-ethylanthraquinone, etc. can be mentioned. Moreover, the photopolymerization accelerator as an accelerator of these photopolymerization initiator (C) can also be used together. As a photopolymerization accelerator, amines, such as N and N-dimethylamino ethyl benzoate ester, N, and N-dimethylamino isoamyl benzoate ester, etc. are raised, for example.

[0021] The desirable operating rate of said urethane (meta) acrylate (A) and a reactant diluent (B) is [ (B) of (A) ] 90 - 10 % of the weight ten to 90% of the weight. When using a photopolymerization initiator (C), (C of the desirable operating rate) is 0.1 - 15 weight section to the (A)+(B) 100 weight section. When using a photopolymerization accelerator, the desirable operating rate is 0.1 - 15 weight section as the sum total of (C) and a photopolymerization accelerator to the (A)+(B) 100 weight section, and the rates of (C) and a photopolymerization accelerator are 90:10-10:90.

[0022] In the resin constituent of this invention, epoxy (meta) acrylate other than the above-mentioned reactant diluent (B), polyester (meta) acrylate, polybutadiene (meta) acrylate, etc. can be used in addition to said urethane (meta) acrylate (A).

[0023] As for epoxy (meta) acrylate other than the above-mentioned reactant diluent (B), the reactant of an oligomer system epoxy resin and an acrylic acid (meta) is mentioned. As an oligomer system epoxy resin, for example The bisphenol A mold epoxy resin For example, (the product made from oil-ized Shell Epoxy, Epicoat 1001, 1002, and 1004, 1006 grades), the epoxy resin (an example --) obtained by the reaction of the alcoholic hydroxyl group of the bisphenol A mold epoxy resin, and epichlorohydrin The Nippon Kayaku Co., Ltd. make, NER-1302, weight per epoxy equivalent 323, 76 degrees C of softening temperatures, a bisphenol female mold epoxy resin (an example and the product made from oil-ized Shell Epoxy --) Epicoat 807, EP-4001, EP-4002, EP-4004 grade, the epoxy resin (an example --) obtained by the reaction of the alcoholic hydroxyl group of a bisphenol female mold epoxy resin, and epichlorohydrin The Nippon Kayaku Co., Ltd. make, NER-7406, weight per epoxy equivalent 350, 66 degrees C of softening temperatures, a bisphenol smooth S form epoxy resin and biphenyl glycidyl ether (an example --) the product made from oil-ized Shell Epoxy, YX-4000, and a phenol novolak mold epoxy resin (an example --) The Nippon Kayaku Co., Ltd. make, EPPN-201, the product made from oil-ized Shell Epoxy, EP-152, EP-154, the Dow Chemical Co. make, DEN-438, a cresol novolak mold epoxy resin (an example, Nippon Kayaku Co., Ltd., and EOCN-102S --) EOCN-1020, EOCN-104S, and triglycidyl isocyanurate (the product made from Nissan Chemistry --) TEPIC and a tris phenol methane mold epoxy resin (the Nippon Kayaku Co., Ltd. make --) EPPN-501, EPN-502, EPPN-503, and a fluorene epoxy resin (an example --) The Nippon Steel Chemical Co., Ltd. make, a cardo epoxy resin, ESF-300, cycloaliphatic epoxy resin (the Daicel Chemical Industries, Ltd. make, SEROKI side 2021P, the SEROKI side EHPE), etc. are raised.

[0024] As polyester (meta) acrylate other than the above-mentioned reactant diluent (B), the above-mentioned polyol compound (a) and the condensate of an acrylic acid (meta) are mentioned. Moreover, as polybutadiene (meta) acrylate, the condensate of the liquid polybutadiene compound and acrylic acid (meta) which have an end hydroxyl group, and the compound to which the liquid polybutadiene compound which has an end hydroxyl group, and the above-mentioned poly isocyanate compound (b) were made to react to, and the further above-mentioned hydroxyl alkyl (meta) acrylate (c) was made to react are mentioned.

[0025] A nonresponsive polymer and an additive can also be used for the resin constituent of this invention in the range which does not check the engine performance. As a nonresponsive polymer, a polyester elastomer, a polyurethane elastomer, a polybutadiene elastomer, an acrylic polymer, etc. are raised, for example, and the amount used is 0 - 50 weight section extent to the (A)+(B) 100 weight section as a rule of thumb. Moreover, as an additive, a leveling agent, a defoaming agent, a coupling agent, a plasticizer, a release agent, an antioxidant, light stabilizer, polymerization inhibitor, waxes, a color, a pigment, etc. are raised, for example, and the amount used is 0 - 10 weight section extent to the (A)+(B) 100 weight section as a rule of thumb, respectively.

[0026] The resin constituent for pressure sensitive adhesive sheet base materials of this invention can be obtained by mixing-dissolving or distributing each above-mentioned component to homogeneity.

[0027] The base material for pressure sensitive adhesive sheets of this invention is the film-like hardened material of the resin constituent for pressure sensitive adhesive sheet base materials of above-mentioned this invention. This film-like hardened material is obtained by irradiating an activity energy line after applying on [ various ] base materials (for example, a release paper, the PET film which carried out mold release processing), and exfoliating various base materials if needed by the approach of a comma coat, a doctor blade, screen-stencil, a curtain flow coat, a spray coat, etc. As an activity energy line, ultraviolet rays, an electron ray, an X-ray, etc. are mentioned. When irradiating ultraviolet rays, and the dose irradiates 10 - 10000 mJ/cm<sup>2</sup> and an electron ray, the dose has desirable 0.1Mrad(s) - 100Mrad. Moreover, 1-1000 micrometers of thickness of the base material for pressure sensitive adhesive sheets of this invention are about 10-500 micrometers preferably.

[0028] A binder constituent is applied to the above-mentioned base material side for pressure sensitive adhesive sheets, and it dries at 50-250 degrees C by far infrared rays or warm air if needed, for example, the pressure sensitive adhesive sheet of this invention is obtained by sticking a mold releasing film etc. if needed further. Moreover, what is necessary is just to prepare a binder layer in both sides of the base material for pressure sensitive adhesive sheets, in order to manufacture a double-sided pressure sensitive adhesive sheet. 1-1000 micrometers of thickness of a binder layer are about 10-500 micrometers preferably.

[0029]

[Example] Hereafter, although a synthetic example and an example explain this invention concretely, this invention is not limited to the following example. The section expresses the weight section among an example.

[0030] The synthetic example 1 (synthetic example of urethane (meta) acrylate A)

It was made to react to the round bottom flask which stirring equipment and a cooling pipe attached at 85 degrees C for about 15 hours until it taught polyester polyol (P-2010, Kuraray Co., Ltd. make, hydroxyl value;55 mgKOH/g) 1020g and tolylene diisocyanate 261g and isocyanate radical concentration became 3.28%. Subsequently, taught 2-hydroxyethyl acrylate 120g and methoxy phenol 0.73g, it was made to react at 85 degrees C for about 10 hours, the reaction was ended in the place where isocyanate concentration became 0.3%, and urethane acrylate (A-1) was obtained.

[0031] It was made to react to the round bottom flask which synthetic example 2 stirring equipment and a cooling pipe attached at 85 degrees C for about 15 hours until it taught polyester polyol (P-2010, Kuraray Co., Ltd. make, hydroxyl value;55 mgKOH/g) 1020g and isophorone diisocyanate 334g and isocyanate radical concentration became 3.10%. Subsequently, taught 2-hydroxyethyl acrylate 120g and methoxy phenol 0.73g, it was made to react at 85 degrees C for about 10 hours, the reaction was ended in the place where isocyanate concentration became 0.3%, and urethane acrylate (A-2) was obtained.

[0032] It was made to react to the round bottom flask which synthetic example 3 stirring equipment and a cooling pipe attached at 85 degrees C for about 15 hours until it taught polyether polyol (PPG-1000, product [ made from Asahi Glass ], hydroxyl value;110 mgKOH/g) 1020g, and hexamethylene diisocyanate 505g and isocyanate radical concentration became 5.51%. Subsequently, taught 2-hydroxyethyl acrylate 239g and methoxy phenol 0.73g, it was made to react at 85 degrees C for about 10 hours, the reaction was ended in the place where isocyanate concentration became 0.3%, and urethane acrylate (A-3) was obtained.



[0033] The synthetic example 4 (synthetic example of urethane (meta) acrylate A)

It was made to react to the round bottom flask which stirring equipment and a cooling pipe attached at 85 degrees C for about 15 hours until it taught polyether polyol (PTG-1000, Hodogaya Chemical Co., Ltd. make, hydroxyl value; 110 mgKOH/g) 1020g and tolylene diisocyanate 696g and isocyanate radical concentration became 9.79%. Subsequently, taught 2-hydroxyethyl acrylate 478g and methoxy phenol 0.73g, it was made to react at 85 degrees C for about 10 hours, the reaction was ended in the place where isocyanate concentration became 0.3%, and urethane acrylate (A-4) was obtained.

[0034] According to the presentation shown in one to example 15 table 1, the resin constituent for pressure sensitive adhesive sheet base materials was prepared. The obtained resin constituent is applied by 100 micrometers of thickness the whole surface on a PET film using a guide, and it is 1000 mJ/cm<sup>2</sup>. It irradiated and the hardening film was obtained. The hauling property of the obtained film, a gel molar fraction, water absorption, and the pressure sensitive adhesive sheet engine performance were evaluated. A result is shown in a table 1-1 to 1-3. In addition, "\*1" in table 1-1 - 1-3 shows METAKU roil denaturation polybutadiene (Ube Industries, Ltd. make), and "\*2" shows 1-hydroxy cyclohexyl phenyl ketone (Ciba-Geigy make), respectively.

[0035] Moreover, the epoxy (meta) acrylate of "\*3" in table 1-1 - 1-3 was compounded by the following approach. That is, taught 472g [ of the bisphenol A mold epoxy resins ] (R-304, product [ made from Mitsui Petrochemistry ], weight per epoxy equivalent; 914), 35g [ of acrylic acids ], and dicyclopentenyl-oxy-ethyl-acrylate (FA-512A, Hitachi Chemical Co., Ltd. make) 507g, methoxy phenol 2g, and triphenyl stibine 5g to the round bottom flask which stirring equipment and a cooling pipe attached, dissolved in it at 60 degrees C, it was made to react at 95 degrees C for 40 hours, and epoxy acrylate was obtained.

[0036] Moreover, the various assessment approaches in table 1-1 - 1-3 are as follows.

(1) Based on hauling property JISK-7127-1989, a tensile stress (kgf/mm<sup>2</sup>), a hauling elastic modulus (kgf/mm<sup>2</sup>), and hauling destructive elongation (%) were measured. For the test piece, the hauling tester was [ 200mm/min. and the measurement temperature of the activity and the hauling rate ] 23 degrees C about RTM-250 (product made from Cage En Tech) using the No. 2 form test piece.

- A....0 to 1 kgf/mm tensile-stress 2B .... 1-2kgf/mm<sup>2</sup>C .... 2kgf/mm<sup>2</sup> It is [ .... 10kgf/mm<sup>2</sup> / It is - hauling destructive elongation (%) above. ] - hauling elastic modulus A above.... Zero to 5 kgf/mm<sup>2</sup>B .... 5-10kgf/mm<sup>2</sup>C

C....500% or more with a% [ B....200 - 500% ] of A....0 - 200% [0037] (2) Reflux of the gel molar fraction hardening film was carried out by the methyl ethyl ketone for 8 hours, and it dried at 90 degrees C for 5 hours, and asked for the gel molar fraction from the following formulas. The inside of the following formula and after processing mean the film weight after desiccation, and the film weight before desiccation is meant before processing.

Gel molar fraction (%) =(after processing)/(before processing) \*100A .... -80%B .... 80 - 90%C .... 90% or more [0038] (3) The water absorption hardening film was immersed in 30-degree C water for 24 hours, and water absorption was searched for from the following formula. The inside of the following formula and after processing mean the film weight after immersion processing, and the film weight before immersion processing is meant before processing.

Water absorption (%) =(after processing) - (before processing))/(before processing) \*100A .... More than 5%B .... 1 - 5%C .... 0 - 1% [0039] (4) The binder constituent was applied to the pressure sensitive adhesive sheet engine-performance hardening film by 30 micrometers of desiccation thickness, it dried at 100 degrees C for 2 hours, and the pressure sensitive adhesive sheet was obtained. This pressure sensitive adhesive sheet was stuck on the griddle, and the residue of the binder to the griddle after exfoliating was measured.

O .... The residue of the binder to a griddle is \*\* which was 0.... It is x which had the residue slightly.... It is [0040] which had the residue so much.

[A table 1]  
table 1-1 [ ] Fruit \*\* Example 1 2 3 4 5 urethane acrylate (A-1) 40 60 80 urethane acrylate (A-2) 50 urethane acrylate (A-3) 50 urethane acrylate (A-4)

[A table 1]

table 1-1 [ ] Fruit \*\* Example 1 2 3 4 5 urethane acrylate (A-1) 40 60 80 urethane acrylate (A-2) 50 urethane acrylate (A-3) 50 urethane acrylate (A-4)

Epoxy acrylate \*3

VTBNX 1300x33 \*1

Isobornyl acrylate 60 40 20 50 50 phenoxy ethyl acrylate acryloyl morpholine IRUGA cure 184 \* 2 2 2 2 2(1) hauling property A tensile stress C C B C C A hauling elastic modulus B A A C A Hauling elongation after fracture B C B B B(2) gel molar fraction C C C C C(3) water absorption C C C C C(4) pressure-sensitive-adhesive-sheet engine performance O O O O O [0041]

[A table 2]

table 1-2 [ ] fruit \*\* Example 6 7 8 9 10 urethane acrylate (A-1) 50 50 50 50 urethane acrylate (A-2) 45 urethane acrylate (A-3)

Urethane acrylate (A-4)

Epoxy acrylate \*3

VTBNX 1300x33 \*1

Isobornyl acrylate 49 48 48 48 42 phenoxy ethyl acrylate 13 acryloyl-morpholine 3-phenoxy-2-hydroxy - 1 2 propylacrylate 2-hydroxyethyl acrylate 22-hydroxypropyl acrylate 2 IRUGA cure 184 \* 2 2 2 2 2 2(1) hauling property A tensile stress C C C C C Hauling elastic modulus B B B B B Hauling elongation after fracture C C C C B(2) gel molar fraction C C C C C (3) water absorption C C C C C(4) pressure-sensitive-adhesive-sheet engine performance O O O O O [0042]

[A table 3]

table 1-3 [ ] fruit \*\* Example 11 12 13 14 15 urethane acrylate (A-1) 30 40 50 urethane acrylate (A-2) 40 urethane acrylate (A-3)

Urethane acrylate (A-4) 50 epoxy acrylate \* 3 10VTBNX(s) 1300x33 \*1 10 10 isobornyl acrylate 60 50 50 40 50 phenoxy ethyl acrylate acryloyl morpholine 10 IRUGA cure 184 \* 2 2 2 2 2 2(1) hauling property Tensile-stress C C C C C Hauling elastic modulus C A B B C Hauling elongation after fracture B B B C A(2) gel molar fraction C C C C C (3) water absorption C C C C C(4) pressure-sensitive-adhesive-sheet engine performance O O O O O [0043] The sheet-like base material which stiffened the resin constituent of this invention can set various hauling properties as arbitration, and its gel molar fraction is high, and its water absorption is low, and it is excellent in the pressure sensitive adhesive sheet property so that clearly from the result of examples 1-15.

[0044]

[Effect of the Invention] When the resin constituent of this invention can be prepared with a non-solvent and the sheet-like hardened material which used this resin constituent changes various presentations, various hauling properties can be set as arbitration, and a gel molar fraction is high, water absorption is low, and it excels in the pressure sensitive adhesive sheet property.

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[Translation done.]